

OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

July 30, 1981

Donald J. Leukens
307 South State
Yates Center, Kansas 66783

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Leukens Lease, Well No. 1, located in Woodson County, Kansas and submitted to our laboratory on July 23, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

5 c to Yates Center, Ks.

Oilfield Research Laboratories
GENERAL INFORMATION & SUMMARY

Company Donald J. Leukens Lease Leukens Well No. 1
 Location NW $\frac{1}{4}$
 Section 32 Twp. 23S Rge. 16E County Woodson State Kansas

Elevation, Feet

Name of Sand.....	Squirrel
Top of Core	1089.0
Bottom of Core	1108.0
Top of Sand	1089.0
Bottom of Sand	1108.0
Total Feet of Permeable Sand	9.0
Total Feet of Floodable Sand	5.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
10 - 30	4.0	4.0
30 - 50	3.0	7.0
50 - 70	2.0	9.0

Average Permeability Millidarcys	35.7
Average Percent Porosity	19.4
Average Percent Oil Saturation	37.4
Average Percent Water Saturation	32.8
Average Oil Content, Bbls./A. Ft.	529.
Total Oil Content, Bbls./Acre	4,762.
Average Percent Oil Recovery by Laboratory Flooding Tests	5.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	90.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	450.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery"

Section

The core was sampled and the samples sealed in plastic bags by a representative of the client. Fresh water mud was used as a drilling fluid. The core was reported to be from a virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, <u>Feet</u>	<u>Description</u>
1089.0 - 1090.0	Light brown sandstone.
1100.0 - 1108.0	Grayish light brown slightly calcareous sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 450 barrels of oil per acre was obtained from 5.0 feet of sand. The weighted average percent oil saturation was reduced from 36.4 to 30.6, or represents an average recovery of 5.8 percent. The weighted average effective permeability of the samples is 5.1 millidarcys, while the average initial fluid production pressure is 23.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 5 produced water and oil and 3 produced water only. This indicates that approximately 56 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1560 barrels of oil per acre. This is an average recovery of 312 barrels per acre foot from 5.0 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	19.7
Oil saturation after flooding, percent	30.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	5.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company			Donald J. Leukens			Lease			Leukens			Well No.			1		
Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.						
			Oil	Water	Total			Ft.	Cum. Ft.								
1	1089.6	19.2	21	39	60	313	44.	1.0	1.0	313	44.00						
2	1100.4	20.1	34	27	61	530	20.	1.0	2.0	530	20.00						
3	1101.5	21.3	38	29	67	628	43.	1.0	3.0	628	43.00						
4	1102.5	19.7	36	36	72	550	26.	1.0	4.0	550	26.00						
5	1103.5	18.9	31	44	75	455	28.	1.0	5.0	455	28.00						
6	1104.5	19.0	53	20	73	781	50.	1.0	6.0	781	50.00						
7	1105.4	19.1	50	29	79	741	31.	1.0	7.0	741	31.00						
8	1106.4	17.4	36	32	68	486	14.	1.0	8.0	486	14.00						
9	1107.5	19.9	38	39	77	278	65.	1.0	9.0	278	65.00						

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Donald J. Leukens	Lease	Leukens	Well No.	1	
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
	1089.0 - 1108.0	9.0	35.7	321.00		
	Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Total Oil Content Bbls./Acre
	1089.0 - 1108.0	9.0	19.4	37.4	32.8	529
						4,762

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Donald J. Leukens

Lease

Leukens

Well No.

1

Company

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	1089.6	19.3	21	314	0	0	21	69	314	372	12.45	20
2	1100.4	20.0	34	528	6	93	28	64	435	30	0.86	35
3	1101.5	21.4	38	631	8	133	30	57	498	260	10.50	20
4	1102.5	19.8	36	533	7	108	29	68	445	310	7.80	20
5	1103.5	18.8	31	452	0	0	31	63	452	254	8.40	20
6	1104.5	19.4	52	783	0	0	52	35	783	304	7.65	20
7	1105.4	19.2	50	745	0	0	50	42	745	0	Imp.	-
8	1106.4	17.5	36	489	4	54	32	60	435	308	5.47	20
9	1107.5	20.0	38	590	4	62	34	52	528	234	8.70	20

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

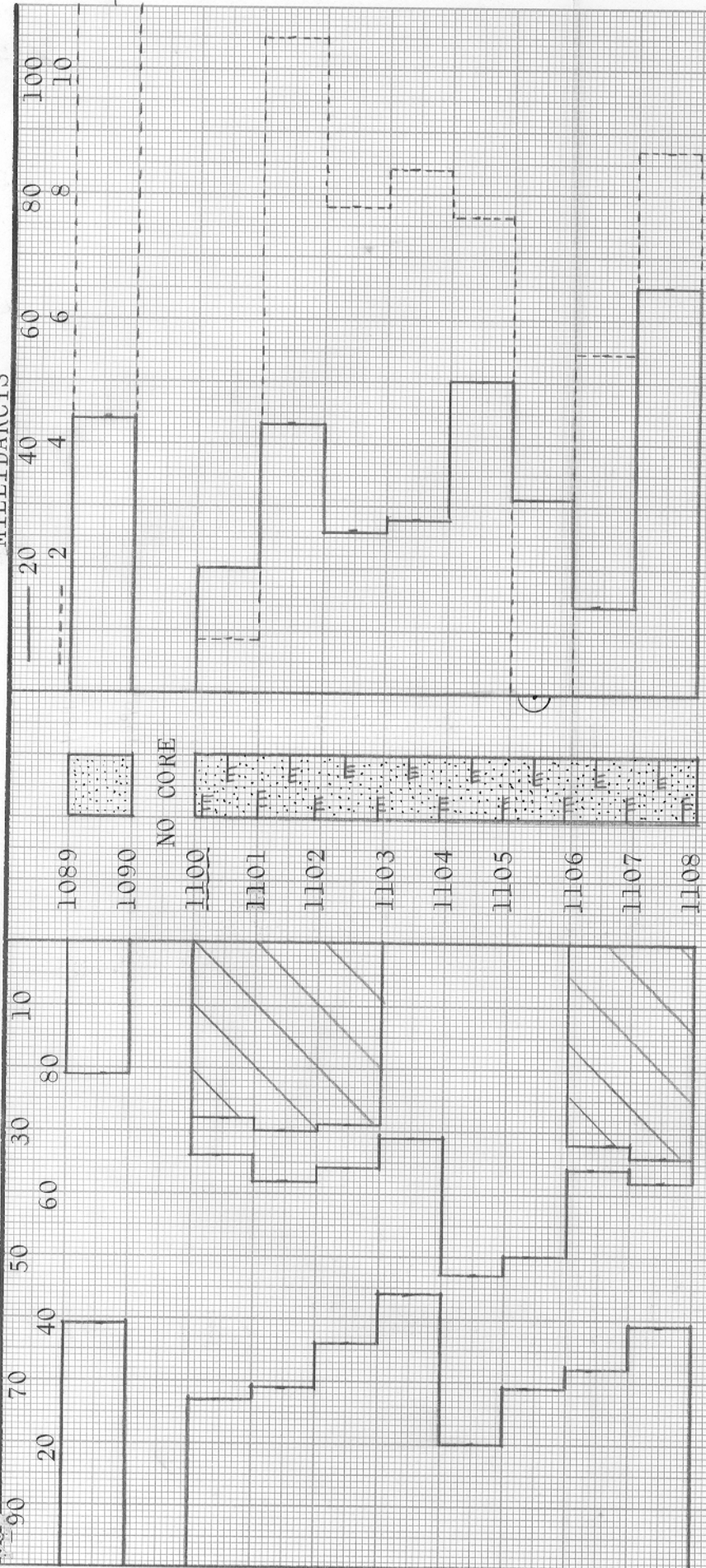
Company	Donald J. Leukens	Lease	Leukens	Well No.	1
Depth Interval, Feet	1089.0 - 1108.0				
Feet of Core Analyzed	5.0				
Average Percent Porosity	19.7				
Average Percent Original Oil Saturation	36.4				
Average Percent Oil Recovery	5.8				
Average Percent Residual Oil Saturation	30.6				
Average Percent Residual Water Saturation	60.2				
Average Percent Total Residual Fluid Saturation	90.8				
Average Original Oil Content, Bbls./A. Ft.	558.				
Average Oil Recovery, Bbls./A. Ft.	90.				
Average Residual Oil Content, Bbls./A. Ft.	468.				
Total Original Oil Content, Bbls./Acre	2,791.				
Total Oil Recovery, Bbls./Acre	450.				
Total Residual Oil Content, Bbls./Acre	2,341.				
Average Effective Permeability, Millidarcys	5.1				
Average Initial Fluid Production Pressure, p.s.i.	23.0				

NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT., ———><——— OIL SAT.,
PERCENT PERCENT

—— PERMEABILITY, IN MILLIDARCS
- - - - EFFECTIVE PERMEABILITY TO WATER, IN
MILLIDARCS

12.45



KEY:

- SANDSTONE
- FLOODPOT RESIDUAL OIL SATURATION
- IMPERMEABLE TO WATER
- CALCREOUS SANDSTONE

KEY:



SANDSTONE



CALCAREOUS SANDSTONE



FLOODPOT RESIDUAL OIL SATURATION



IMPERMEABLE TO WATER

DONALD J. LEUKENS

LEUKENS LEASE

WOODSON COUNTY, KANSAS

WELL NO. 1

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYs	CALCULATED OIL RECOVERY BBLs. / ACRE
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1089.0 - 1108.0

9.0

19.4

37.4

32.8

35.7

1560

(PRIMARY AND
WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
JULY, 1981

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